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(54) Abstract Title
Video security system coupled to a fax modem

(57) A security system comprises: one or more video cameras 10 producing video signals; a frame store 40 for storing a frame of at least one of the video signals; at least one burglar alarm sensor 32 operable to produce an alarm signal; a fax modem 44 ; and a controller 46 which is responsive to such an alarm signal to cause the fax modem to call a stored fax number and transmit a stored video frame as a fax signal. The system may be associated with and interact with a video surveillance and recording system 14, 26, 28.

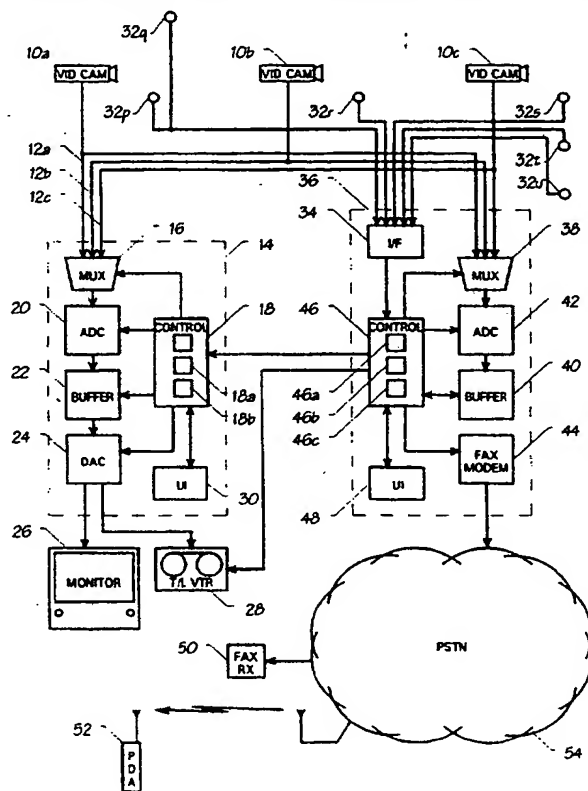


FIG. 1

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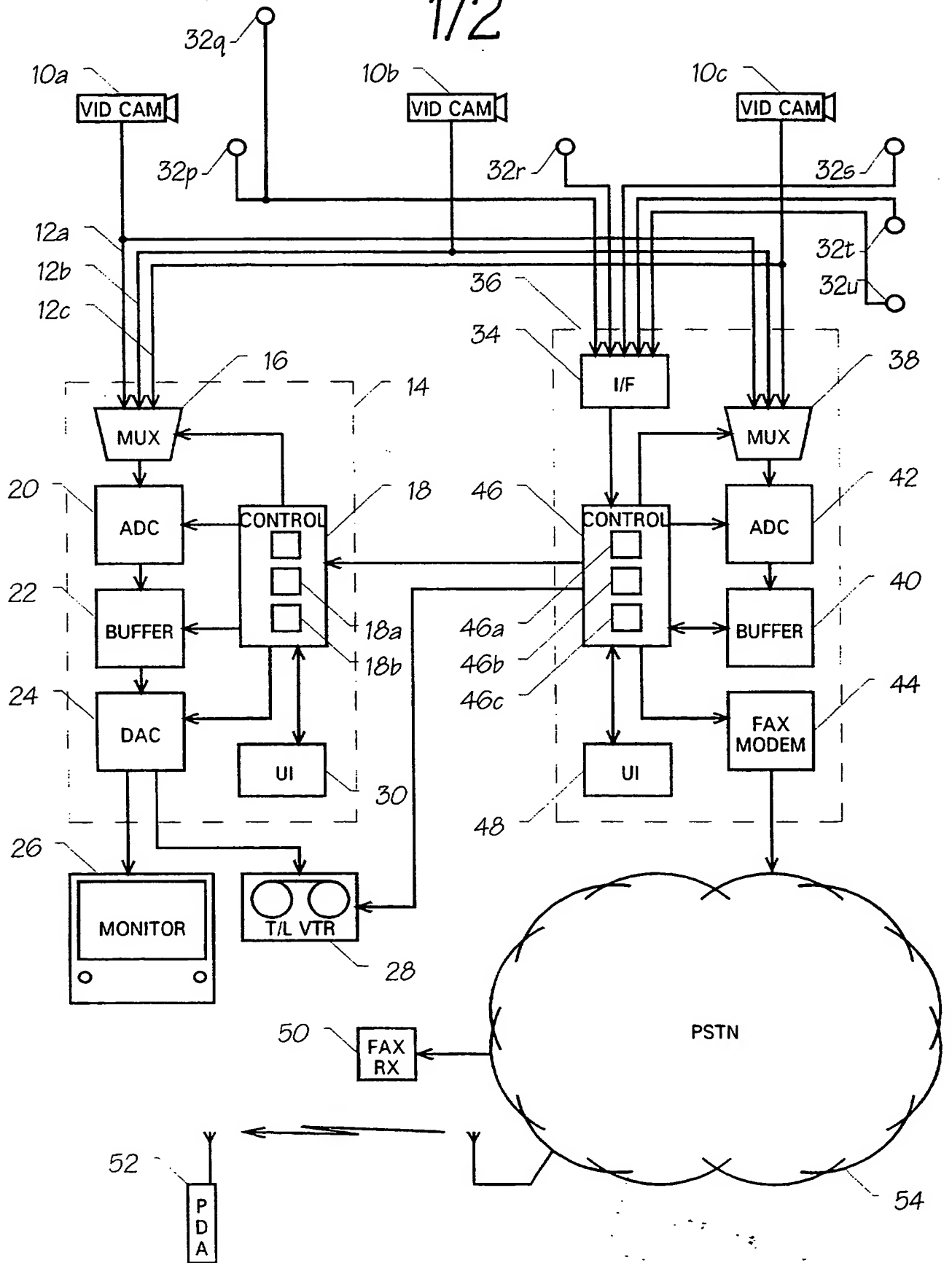
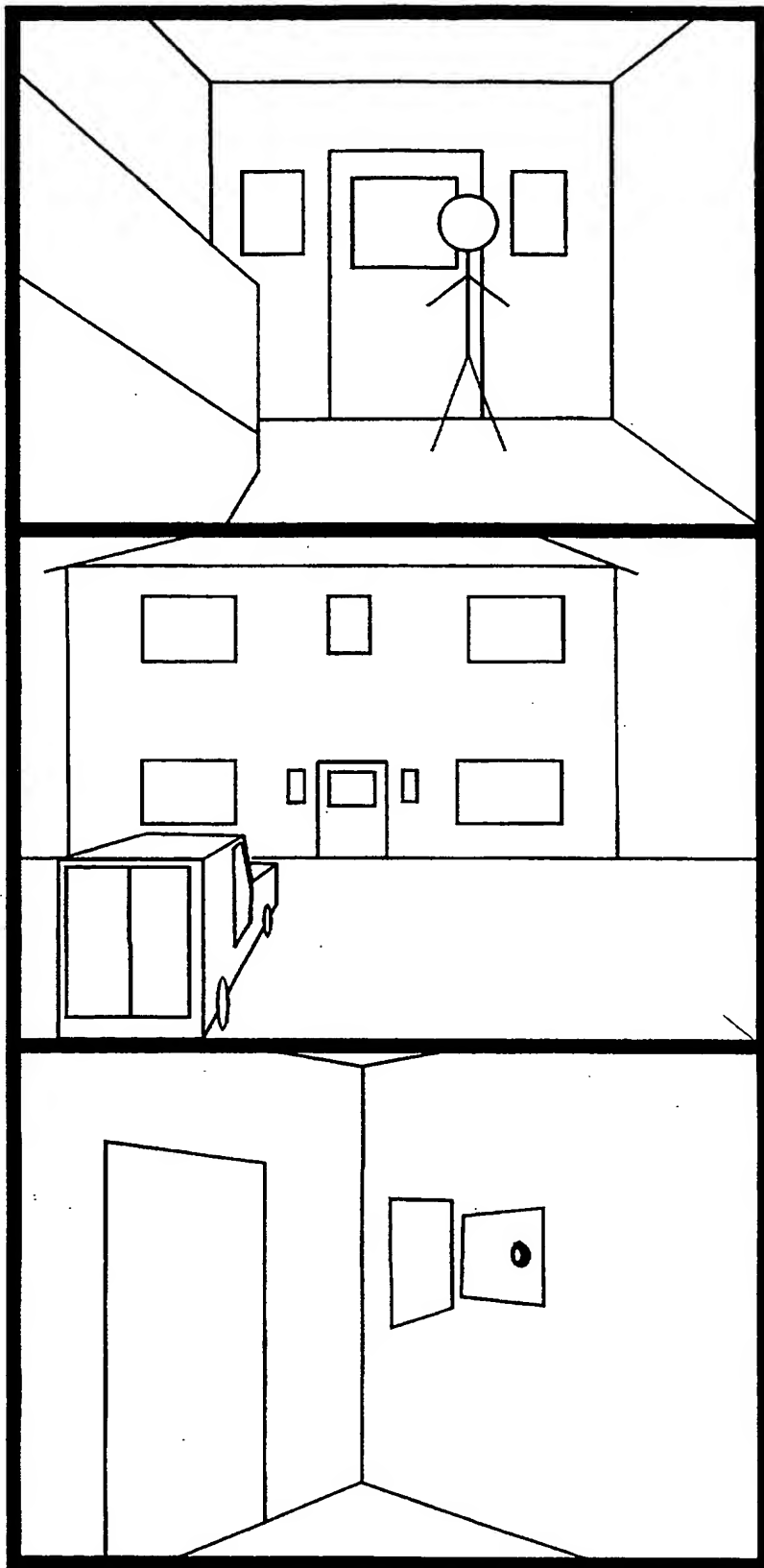


FIG. 1

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HOME. ALARM COMMENCED 10:38:12 17/01/97. PAGE 2. BATTERY W. HALL, STUDY.



10:40:10 17/01/97. S:STUDY. C:STUDY. 10:39:28 17/01/97. S:BATHRM W. C:FRONT. 10:39:26 17/01/97. S:HALL. C:HALL.

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FIG. 2

TITLE

VIDEO SECURITY SYSTEMS

DESCRIPTION

5 This invention relates to video security systems.

 In accordance with the present invention, there is provided a security system comprising: an input for a video signal (for example from a video camera); means for storing a frame of the video signal; a burglar alarm sensor operable to produce an alarm signal; a fax modem; means for storing a fax number; and a controller which is
10 responsive to such an alarm signal to cause the fax modem to call the stored number and transmit such a stored video frame as a fax signal.

 Advantageously, there may be a plurality of such burglar alarm sensors, with the controller being responsive to each of them.

 Also, the video input may advantageously be arranged to receive a plurality of
15 different such video signals from respective sources, and the system may further comprise a video multiplexer for passing at least one selected one of the video signals to the video frame storing means.

 In this case, the controller is preferably arranged to control the multiplexer selection in dependence upon which of the burglar alarm sensors is operated.

20 Advantageously, the controller may be arranged to cause the stored frames from more than one of the video sources to be transmitted in a single fax transmission.

 The system preferably further comprises a text generator arranged to add a text message to the stored or transmitted video frame. The controller may be arranged to cause the text generator to generate such a text message identifying which of the burglar
25 alarm sensors, or which group of the burglar alarm sensors, is causing the fax signal to be transmitted. Alternatively or additionally, the controller may be arranged to cause the

text generator to generate such a text message identifying the source of the video signal which is to be transmitted. Alternatively or additionally, the controller may be arranged to cause the text generator to generate such a text message dependent on the status of the system.

- 5 The system may further comprise a time-lapse video recorder for recording the video signal, or at least one of the video signals, and in this case the controller may be advantageously operable in response to such an alarm signal to cause the video recorder to increase its recording rate. Also, the system may further comprise a further video multiplexer for sequencing the sources of the video signals passed to the video recorder, and in this case the controller may be advantageously operable to cause the sequencing to be modified in dependence which of the burglar alarm sensors is operated.

A specific embodiment of security system according to the present invention will now be described by way of example with reference to the accompanying drawings, in which:

- 15 Figure 1 is a block diagram of the security system; and
- Figure 2 shows an example of a fax page transmitted by the system.

- Referring to Figure 1, the security system includes a plurality of video cameras 10, three 10a, 10b, 10c of which are shown, and each of which provides a respective monochrome, one volt peak-to-peak, analogue video signal 12a, 12b, 12c. The system also includes a multiplexing apparatus 14 comprising an analogue video multiplexer 16, which receives the video signals 12 and passes a selected one of them as an output in dependence upon a selection signal from a controller 18. The output signal from the multiplexer 16 is digitised by an analogue-to-digital converter (ADC) 20 and is stored in a frame buffer 22. Frames are continuously output from the frame buffer 22 via a digital-to-analogue converter 24 to a monitor 26 and a time-lapse video tape recorder 28. The controller 18 includes a microprocessor 18a and EPROM 18b, and the multiplexing apparatus 14 also has a user interface 30, for example in the form of a keypad and a small LCD display, by which the multiplexing apparatus can be set up.

The system described so far with reference to Figure 1 is conventional. In an example of its operation, the video cameras 10 continuously supply video signals 12 to the multiplexer apparatus 14, and the multiplexer apparatus 14 outputs eight identical frames derived from video signal 12a, eight identical frames derived from video signal 12b, eight identical frames derived from video signal 12c, another eight identical frames derived from video signal 12a, and so on. The video recorder 28 records one in every eight frames, so that adjacent frames recorded on the tape are derived from different cameras 10, and so that a three hour video tape, for example, can span a period of twenty-four hours.

10 In the embodiment of the invention, a number of burglar alarm sensors 32 are provided, six 32p, 32q, 32r, 32s, 32t, 32u of which are shown. Some of the sensors 32p, 32q, 32r, 32s have detection positions or areas which are in the fields of view of the video cameras 10a, 10b, 10c, whereas others 32t, 32u are not necessarily in the field of view of any of the cameras 10a, 10b, 10c. Each sensor may be of any appropriate
15 type, such as a passive infra-red detector or microwave Doppler sensor which detects movement of a person, a magnet and reed switch sensor which detects opening of a door or window, a pressure mat, a light beam or light curtain sensor which detects breaking of the beam or curtain, a foil which detects breaking of a window, etc. Each of the sensors may have a tamper detection facility and a separate tamper channel, or all
20 of the sensors may share a common tamper channel.

The sensors 32 supply their alarm signals to respective zone inputs of an interface circuit 34 of a security apparatus 36. Some 32r to 32u of the sensors 32 may have their own zone inputs, whereas others 32p, 32q of the sensors 32 may share a zone input or inputs. The apparatus 36 includes a further analogue video multiplexer 38 which
25 receives the video signals from the cameras 10 and passes a selected one of the signals to a frame buffer 40 via an ADC 42. The apparatus 36 furthermore includes a fax modem 44 (which may be connected to the public switched telephone network 54 or which may use a cellular telephone system), a controller 46 which includes a microprocessor 46a and an EPROM 46b, and a user interface 48 for example in the
30 form of a keypad and a small LCD display, by which the security apparatus 36 can be

set up, including entering the telephone number(s) of at least one fax receiver (such as a conventional fax machine 50, a fax modem in a computer, or a cellular fax receiver such as a personal digital assistant 52) which is stored in the EPROM 46b.

During quiescent operation of the security apparatus 36, the controller 46
5 operates so that the multiplexer 38 does not pass any of the video signals to the buffer 40 via the ADC 42. However, if one or more of the sensors 32p to 32u supplies an alarm signal to the interface circuit 34, the interface circuit 34 indicates to the controller 46 which of the sensors has or have been operated. In response and in a simple configuration, the controller 46 causes a frame of a selected one of the video signals 12
10 to be digitised by the ADC 42 and stored in the frame buffer 40, the selection being made in dependence upon which of the sensors 32p to 32u has been operated. The controller 46 then causes the fax modem 44 to dial the fax number, or one of the fax numbers, stored in the EPROM 46b and to negotiate transmission of a fax. If successful, the controller 46 then reads the data for the frame from the buffer 40 and converts it into
15 a fax signal, modifying the resolution as necessary and compressing the image data in a manner known per se. The fax signal is transmitted to the fax receiver 50 or 52 which can then print the frame or display it on a screen.

A number of modifications and developments may be made to the embodiment described above, for example as follows:-

- 20 a. The controller 46 may be programmed to determine when the transmission of a frame as a fax signal has been completed, and then to store a further frame in the buffer 40 and transmit that frame. Transmission of further frames may continue until the controller 46 determines that a predetermined period of time has elapsed, or that the fax receiver 50 or 52 has hung up.
- 25 b. In a development of "a", if more than one of the sensors 32p to 32u has been operated, the controller 46 may cause the multiplexer 34 to sequence the cameras 10a to 10c from which the frames are taken, in dependence upon which of the sensors 32p to 32u have been operated, so that pages of fax images are transmitted from various appropriate cameras.

c. In an additional or alternative development to "b", if more than one of the sensors 32p to 32u has been operated, the controller 46 may cause the multiplexer 34 to sequence the cameras 10a to 10c from which the frames are taken, in dependence upon which of the sensors 32p to 32u have been operated, and may cause the buffer 40
5 to store more than one of the frames with a reduced size in an array, such as a 2 x 2 landscape array, or a 1 x 3 portrait array, as shown in Figure 2. The multiple frames may then be transmitted as a single fax page 54.

d. Provision may be made for a user to enter via the user interface 48 associations between the sensors 32p to 32u and the cameras 10a to 10c, and these
10 associations are stored in the EPROM 46b and used by the controller 46 in determining which sensors 32p to 32u cause which cameras 10a to 10c to have their frames transmitted. For example, sensors 32p, 32q might be associated with camera 10a, sensor 32r with camera 10b, and sensor 32s with camera 10c, because those sensors cover areas or positions in the field of view of the respective camera. However, say that sensors 32t,
15 32u are not in the field of view of any of the cameras, and say that the camera 10b covers the only area where a burglar could reasonably park their getaway vehicle near the property. The sensors 32t, 32u might then be associated with the camera 10b, so that operation of either of those sensors would cause a frame to be transmitted from the camera 10b, for example frame 56 in Figure 2.

20 e. The controller 46 may include a text generator and be operable to add text messages to the transmitted fax. For example, as shown in Figure 2, each transmitted page may include a message indicating the identity of the site, the time and date the alarm was raised, the battery level of a battery for powering the system, and the identity of the sensors which have been triggered. Also, each frame may include a message
25 indicating, for example, the time and date the frame was generated, the identity of the sensor(s) which caused the frame to be generated, and the identity of the camera which generated the frame.

f. The controller 46 of the security apparatus may be used to cause the operation of the controller 18 of the multiplexing apparatus 14 and the operation of the
30 VTR 28 to change. For example, when any of the sensors 32 is activated, the controller

46 can signal the VTR 28 to change to a real-time mode, rather than the time-lapse mode so that the maximum amount of evidence can be collected. Also, in this case, the controller 46 can signal the controller 18 to cause the sequencing by the multiplexer 16 to change in an appropriate manner. For example, if one or more sensors 32 associated
5 with one of the cameras 10, for example camera 10a, have been activated, but none of the other sensors have been activated, the controller 16 may control the multiplexer 16 so that the recorded frames are in the sequence: 25 frames derived from camera 10a, one frame from camera 10b, one frame from camera 10c, 25 frames from camera 10a, and so on. If one or more sensors 32 associated with camera 10c are then activated, the
10 controller 16 may modify the control of the multiplexer 16 so that the recorded frames are in the sequence: 25 frames derived from camera 10a, one frame from camera 10b, 25 frames from camera 10c, 25 frames from camera 10a, and so on. If one or more sensors 32 associated with camera 10b are then activated, the controller 16 may further modify the control of the multiplexer 16 so that the recorded frames are in the sequence:
15 25 frames derived from camera 10a, 25 frames from camera 10b, 25 frames from camera 10c, 25 frames from camera 10a, and so on.

It will be appreciated that many other modifications and developments may be made within the scope of the invention. For example, the multiplexing apparatus 14, monitor 26 and VTR 28 may be omitted. The system may include any number of
20 cameras, including one camera in which case there is no need for multiplexing, and any number of burglar alarm sensors, including one.

CLAIMS

1. A security system comprising: an input for a video signal; means for storing a frame of the video signal; a burglar alarm sensor operable to produce an alarm signal; a fax modem; means for storing a fax number; and a controller which is responsive to
5 such an alarm signal to cause the fax modem to call the stored number and transmit such a stored video frame as a fax signal.
2. A system as claimed in claim 1, wherein there is a plurality of such burglar alarm sensors, the controller being responsive to each of them.
3. A system as claimed in claim 1 or 2, wherein the video input is arranged to
10 receive a plurality of different such video signals from respective sources, and further comprising a video multiplexer for passing at least one selected one of the video signals to the video frame storing means.
4. A system as claimed in claim 3 when dependent on claim 2, wherein the
15 controller is arranged to control the multiplexer selection in dependence upon which of the burglar alarm sensors is operated.
5. A system as claimed in claim 3 or 4, wherein the controller is arranged to cause the stored frames from more than one of the video sources to be transmitted in a single fax transmission.
6. A system as claimed in any preceding claim, further comprising a text generator
20 arranged to add a text message to the stored or transmitted video frame.
7. A system as claimed in claim 6 when dependent directly or indirectly on claim 2, wherein the controller is arranged to cause the text generator to generate such a text message identifying which of the burglar alarm sensors, or which group of the burglar alarm sensors, is causing the fax signal to be transmitted.
- 25 8. A system as claimed in claim 6 or 7 when dependent directly or indirectly on claim 3, wherein the controller is arranged to cause the text generator to generate such a text message identifying the source of the video signal which is to be transmitted.

9. A system as claimed in any of claims 6 to 8, wherein the controller is arranged to cause the text generator to generate such a text message dependent on the status of the system.
10. A system as claimed in any preceding claim, further comprising a time-lapse
5 video recorder for recording the video signal, or at least one of the video signals.
11. A system as claimed in claim 10, wherein the controller is operable in response to such an alarm signal to cause the video recorder to increase its recording rate.
12. A system as claimed in claim 10 or 11 when dependent directly or indirectly on claim 2, further comprising a further video multiplexer for sequencing the sources of
10 the video signals passed to the video recorder, and wherein the controller is operable to cause the sequencing to be modified in dependence which of the burglar alarm sensors is operated.
13. A system as claimed in any preceding claim, further comprising at least one video camera connected to the video signal input.
- 15 14. A security system substantially as described with reference to the drawing.



Application No: GB 9701098.7
Claims searched: 1-14

Examiner: John Coules
Date of search: 18 March 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK CI (Ed.O): H4F FAAE; H4K KOD2,KOB
Int CI (Ed.6): H04N 1/32,7/18; H04M 11/04; G08B 13/196
Other: Online: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	EP 0429364 A1 (GOLDSTAR) see whole doc, particularly col 5 line 3 to col 6 line 29	1 at least
X	WO 96/15615 A1 (EMMEPI) see whole doc, particularly page 5 lines 8-28, page 7 lines 17-22 and page 14 lines 15-19	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
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&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.